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November 8, 2000

Ms. Sharon Jaffess  
U.S. Environmental Protection Agency  
290 Broadway  
19th Floor  
New York, New York 10007

Dear Ms. Jaffess:

Enclosed please find comments prepared by PVSC's technical advisors on Chemical Land Holdings' CSO Trial Run Recommendation Report. PVSC has serious concerns regarding the quality of the data that is presented in this report. We would like CLH to perform another trial sampling program prior to expanding to the full scale sampling work. In our opinion this trial did not successfully prove a clear sampling method and the analytical results do not appear to meet the data quality objectives of the ESP.

We would like to schedule a technical meeting with you, the CARP workgroup, and PVSC's technical representatives to discuss sampling and analysis methods that are more suitable for high moisture content sediments than the hazardous waste methods utilized under this trial run. Please contact Bridget McKenna, of my staff, at (973) 817-5976 to schedule a meeting.

Sincerely,

PASSAIC VALLEY SEWERAGE COMMISSIONERS

  
Sheldon Lipke, P.E.

Superintendent of Plant Operations

SL/bm

c: Robert J. Davenport, Executive Director  
Frank D'Ascensio, Industrial & Pollution Control Manager  
James McCarthy, Manager of Plant Engineering  
Bridget McKenna, Process Control Engineer 3  
Peter Sheridan, PVSC Counsel  
G.M. DeGraeve, GLEC  
Robert Kerbel, Malcolm Pirnie  
John Rolak, Killam Associates  
Clifford Firstenberg, Chemical Land Holdings

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## **Summary of Review Comments of the CSO Trial Run Recommendation Report**

The CSO Trial Run Program was conducted to compare and evaluate two sediment sampling methods; sediment traps and bulk sampling. The sediment trap samples were collected over a thirty-day period and then sent for laboratory analysis. The bulk samples were obtained by collecting water samples during an overflow event, filtering the water, and sending the filter, along with the all retained sediment for laboratory analysis. The following text summarizes the comments from the review of the CSO Trial Run Recommendation Report prepared by Chemical Land Holdings (CLH). During the review, several issues that need further clarification and evaluation before proceeding to a full-scale CSO monitoring program were identified. It should be noted that in some cases, the report did not supply sufficient detail to thoroughly evaluate the data collected. These cases are noted below. In addition, comments are summarized below and have been placed into several general categories.

### **Sampling System Design Issues**

#### **A) Sediment Traps**

The sediment traps that CLH installed to trap fine sediments in PVSC=s CSOs did not work as well as CLH had hoped. Due to the trial run results, CLH indicated that the sediment traps would not be used in the full-scale CSO monitoring program. If it is subsequently decided to keep the sediment trap sampling, the following problems should be resolved.

- The quantity of sediments obtained in the sediment traps during the monitoring periods did not, at first, appear to be consistent. A number of rainfall events and anticipated overflow events in the first two periods produced a small amount of sediment. However, the sediment collected in the last two weeks of monitoring, from what appears to be a single event, is much greater. Therefore, an assessment of rainfall/precipitation patterns recorded at Newark Airport during each sediment sampling period was conducted. This assessment indicated that the higher collection of sediments during the last two weeks of monitoring could be reasonable based on the accumulation of solids in the collection and the first flush phenomenon. It should be noted, however, that this episode illustrates a potential problem with the interpretation of this information. Care must be taken not to extrapolate data collected after significant periods of low rainfall to an annual loading of sediment. In the future, in order to aid in interpretation of the data, precise documentation of the weather and actual time of the overflow event should be included in the report.
- It is not clear how CLH determined if there was Awash-out≡ in the sediment traps by re-deploying the traps in mid-January. However, during the second trial CLH also found uneven sediment capture rates.
- There was trap to trap variability in the quantity of sediments collected. The reason for this variability should be determined.
- There was also variability in the analytical results obtained from the two different sampling methods (i.e., sediment trap and bulk sampling). The chemical results for the sediments collected using the traps were considerably different from the results obtained for the sediments collected by filtering the bulk water sample. The reason why the analytical results from the two collection methods are not comparable should be investigated.

#### **B) Bulk Sampling**

- The report states that a bulk water sample (400 gallons) was collected during an overflow event on January 4, 2000. The report does not state over what period the sample was collected or at what rate. This is important because a review of the period of rainfall and tidal elevations indicates that the rainfall occurred during a period of high tide. Tidal records indicate that a high tide occurred at 7:00 p.m. while the period of rainfall occurred between 4:00 p.m. and 10:00 p.m. It should be verified that the sampling occurred during an actual

overflow event. In addition, there could have been an accumulation of solids behind the tide gate in the area of the pump if tidal elevations were preventing a discharge. This could also impact the quantity and quality of the sediments.

- The report states that flow was measured by an automatic sampler. It is presumed that this should read an automatic meter. Details on how and where the meter was installed should be requested to determine the validity of these readings.
- The report states that samples from the tank were collected the following day, and three days later. The question is how was this bulk sample stored. All standard methods require samples be maintained at 4EC which is around 39EF. A review of climatology information for the period in Newark shows that the air temperatures ranged from 25 to 50EF.
- The bulk samples were collected behind the weir. Since many of the weirs are not that high relative to the dry weather flow, the area behind the weir could be contaminated from splashing from dry weather flows. In addition, if the pump were placed directly on top of the concrete the suction from the pump could scour the concrete collecting materials that had accumulated over time in this area and not necessary materials within the flow column. Information as to how the pump is being used should be obtained to evaluate potential sources of contamination.
- The report indicates that grain size distribution was developed using a laser diffraction methodology. Is this an EPA approved method?
- The report indicates that on March 2, 2000 a subsequent round of filtered sediments were collected from the tank. Was this based on a second round of sampling or from the January 4 event?

#### C) Full-Scale Program

- The report outlines a proposed full-scale program in which two sites will be used to further evaluate the logistics associated with the program. It should be noted that one of the sites, Worthington Avenue, appears to have a blocked or collapsed discharge pipe. Monitoring conducted several years ago at this site indicated that this system surcharged easily.

#### Data Quality Issues

Overall, there appeared to be substantial quality control issues as the majority of the data were qualified and/or rejected. These data quality issues must be addressed prior to the implementation of the full-scale CSO monitoring program. Overall, it should be determined whether the data quality issues are a result of poor sample system design or poor analytical technique.

#### A) Elevated Detection Limits

All of the sediment obtained using the bulk sampling method had a high moisture content (i.e., > 50% water). Whenever a solid sample has a high moisture content, the sample quantitation limit (SQL)<sup>1</sup>, as well as the detected results, are biased high (i.e., the concentrations are elevated). For example, the phenol SQL for the bulk sample was 1,900 micrograms per kilogram (:g/kg) while the phenol DL for the sediment trap sample was 510 :g/kg.

- The analytical methods used by CLH are solid waste methods (SW-846), which may not yield detection limits consistent with the detection limits being achieved using the methods prescribed for the CARP program. The analysis procedure selected for the extracted and

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<sup>1</sup> The quantitation limit (QL) is the lowest concentration of a substance (e.g., phenol) that a specific analytical method can reliably detect. The SQL is the quantitation limit corrected for sample-specific characteristics such as percent moisture.

cleaned-up samples should be determined based upon the detection limit objectives of the program (high resolution versus low resolution mass spectrometry, for example)

- It appears that the laboratory may have extracted and prepared the samples for analysis improperly. There is no reason that moisture should interfere with the analyses, because there are approved procedures for drying samples in the sample preparation process. It seems that this difficulty arose because CLH utilized a laboratory experienced with solid waste analysis (where moisture is less of an issue), rather than a laboratory experienced with aqueous samples. The clean up and preparation procedures that should be used to process wet sediment samples are contained in the following recognized analytical methods:

NOAA. 1998. Sampling and Analytical Methods of the National Status and Trends Mussel Watch Project: 1993-1998 Update. NOAA Technical Memorandum NOS/ORCA/CMBAD 130. National Oceanic and Atmospheric Administration, Silver Springs, MD.

NOAA. 1993. Sampling and Analytical Methods of the National Status and Trends Program National Benthic Surveillance and Mussel Watch Project. Elemental Analytical Methods (Volume III) and Analytical Procedures to Quantify Organic Contaminants (Volume IV). NOAA Technical Memorandum NOS ORCA 71. National Oceanic and Atmospheric Administration, Silver Springs, MD.

U.S. EPA and U.S. Army Corps of Engineers. 1991. *Evaluation of Dredged Material Proposed for Ocean Disposal: Testing Manual*. Document: EPA-503/8-91/001. February 1991.

U.S. EPA and U.S. Army Corps of Engineers. 1994. *Evaluation of Dredged Material Proposed for Discharge in Waters of the U.S. - Testing Manual (Draft): Inland Testing Manual*. Document: EPA-823-B-94-002. June 2, 1994.

U.S. EPA. 1993. Environmental Monitoring and Assessment Program (EMAP) - Estuaries; Virginia Province - Quality Assurance Project Plan. U.S. EPA, Office of Research and Development, Washington, DC, 20460. 1993.

- According to the data quality objectives (DQOs) contained in the Ecological Sampling Quality Assurance Project Plan (QAPP), the sediment QLs should be lower than the sediment quality guideline values. If the QL is greater than the guideline values, it is not possible to determine whether substances listed as non-detected by the laboratory are present at concentrations that exceed the guideline values. An example of this is detailed below:

<u>Substance</u>	<u>NOAA ER-M</u>	<u>SQL</u>
Fluorene	540 :g/kg	1,000 :g/kg

According to the QAPP, for chemicals that have SQLs greater than the ER-L values (and are detected in at least some of the sediment samples), the concentration used in the risk assessment will be equal to the SQL. Therefore, if elevated SQLs are consistently obtained, the risk analysis may erroneously inflate the risk to the study area. Similarly, detected results that are biased high could also erroneously inflate the actual risk.

#### B) Other

- It appears that CLH used two different laboratories to perform the analyses; one for the more conventional priority pollutant parameters, and one for the PCB congener and dioxin/furan analyses. For the most part, the PCB and dioxin/furan results seem credible (measured concentrations reasonable and duplicates fairly consistent), in contrast to the remainder of the results.
- It is important to obtain the total suspended solids (TSS) data and the volume filtered for the bulk samples since this data could be used to calculate the concentrations associated with particulates in mg/L, which is the conventional approach used to evaluate contaminant

loading data. Presenting data in mg/L would also be consistent with the way that CARP data are being recorded.

- The concentration of dissolved phase solids in the bulk sample are suspiciously low considering what might typically be expected from a highly urbanized/industrial watershed. The reason for this should be investigated.
- The following additional information will be required before the data can be interpreted and conclusions drawn: (1) Is it accurate to assume that the unfiltered and filtered aqueous samples that were collected by CLH in January 2000 were obtained from the bulk sample that was collected on January 4, 2000, or was the bulk sample used only to obtain the samples which were filtered on January 7, 2000 for sediment analysis? (2) How did CLH extract the sediment samples that were obtained by filtering the bulk samples? This is a major question, because it relates to the common use of the "M" qualifier that is so prevalent in CLH's data. (3) How was the 400 L sample homogenized prior to collecting the samples for filtering.

#### Summary of Recommendations

The current field trial results have failed to demonstrate that the selected sampling and analytical methodologies can produce data that meet the data quality objectives of the CARP program. Therefore without a successful field trial in advance of a full-scale program, there is no reason to believe that the data which would be generated would be of sufficient quality to develop credible conclusions. Based on this assessment the following recommendations are offered. The recommendations are predicated upon sediment traps not being used during the full-scale program.

- Another field trial should be conducted prior to the implementation of a full-scale monitoring program. Also, the plan to resample Saybrook Place as part of the full-scale sampling program should be reconsidered until verifiable data are obtained from another field trial.
- The positioning of the sampling equipment used for the collection of the bulk samples should be carefully evaluated to ensure that it does not impact the results. Similarly, the weather and tidal patterns during sampling should be documented and reviewed to ensure that they do not impact the results.
- An assessment should be made of why so little usable data was produced and why the detection limits were so elevated. This assessment should include evaluating the sampling protocols, the analytical methods, the laboratory's performance, and the quality assurance/quality control (QA/QC) associated with the sampling and analysis.
- A method of handling the high moisture content in the sediment samples must be found. This should include reevaluating the analytical methods as well as the sampling methods. The analytical methods being used should be able to produce reliable data at low enough detection limits to assure comparability with the CARP program. The sampling method should obtain sediment samples with a lower moisture content. The trial run report indicated that the use of a portable centrifuge was being evaluated. If this is not a viable option, a full-scale sampling program should not commence until a solution is found (e.g., vacuum filtration system). It should be noted that any equipment that comes in contact with the water must be thoroughly decontaminated to avoid cross-contamination.
- All of the proper QA/QC samples (e.g., equipment blanks) should be collected during the sampling.
- Suspended solids data as well as the volume filtered should be provided for the bulk sample, so that comparisons can be made between the filtered and non-filtered samples.

*Mailed to Glen Brennan 9/19*



*PVSC*

Great Lakes Environmental Center

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Phone: (231) 941-2230 / Facsimile: (231) 941-2240  
email: glec@mich.com

**MEMORANDUM**

**From:** Mick DeGraeve GLEC  
**To:** Bridget McKenna PVSC  
**Date:** August 21, 2000  
**Subject:** CSO Trial Run Recommendation Report Prepared by Chemical Land Holdings (CLH)

At your request, Bill Clement and I have reviewed the report generated by Chemical Land Holdings, Inc. (CLH) entitled Summary of CSO Trial Run Program and Full-Scale Recommendation Report, dated June 2000. The report summarizes CLH's trial CSO sampling program at PVSC's Saybrook Place CSO in Newark, and provides recommendations for CLH's full-scale sampling program (including potential program modifications). Below we have summarized our comments on CLH's report and the conclusions/recommendations which were made by CLH; we have also made recommendations on how we believe CLH's program should proceed.

**GENERAL COMMENTS**

- The sediment traps that CLH installed to trap fine sediments in PVSC's CSOs did not work as well as CLH had hoped. The difficulties CLH encountered included trap-to-trap variability in the quantities of sediments collected, and the chemical results for the sediments collected using the traps were considerably different from the results obtained from the sediments collected by filtering the bulk water sample.
- It is not clear how CLH determined if there was "wash-out" in the sediment traps by re-deploying the traps in mid-January. However, during that second trial CLH also found uneven sediment capture rates, which presumably contributed to their decision to abandon

that sampling strategy.

- Overall, considering the number of analyses that were performed, very little useable information was generated, because most of the data have been qualified in one fashion or another.
- The analytical methods which were used by CLH for analyzing the samples they collected are solid waste methods (SW 846), which do not yield detection limits consistent with the detection limits being achieved using the methods prescribed for the CARP program.
- The issue of high detection limits due to excess moisture in the sediment samples (or filters?), which resulted in many samples being qualified with the "M" qualifier is puzzling, and certainly needs clarification and explanation. Our belief is that the laboratory(s) used methods which are inconsistent with methods appropriate for wet sediments, and that they were inexperienced in addressing moisture in preparing the samples for analysis. It appears that the laboratory extracted and prepared the samples for analysis improperly. There is not a good reason that moisture should interfere with the analyses, because there are approved procedures for drying samples in the sample preparation process. There is no reason for CLH to consider moisture removal techniques such as filter presses, air drying or centrifugation for coping with moisture removal from solids. It seems that this difficulty arose because CLH utilized a laboratory experienced with solid waste analysis (where moisture is less of an issue), rather than a laboratory experienced with aqueous samples.
- The clean up and preparation procedures that should be used to process wet sediment samples are contained in the following recognized analytical methods:

NOAA. 1998. Sampling and Analytical Methods of the National Status and Trends Mussel Watch Project: 1993-1998 Update. NOAA Technical Memorandum NOS/ORCA/CMBAD 130. National Oceanic and Atmospheric Administration, Silver Springs, MD.

NOAA. 1993. *Sampling and Analytical Methods of the National Status and Trends Program National Benthic Surveillance and Mussel Watch Project. Elemental Analytical Methods (Volume III) and Analytical Procedures to Quantify Organic Contaminants (Volume IV)*. NOAA Technical Memorandum NOS ORCA 71. National Oceanic and Atmospheric Administration, Silver Springs, MD.

U.S. EPA and U.S. Army Corps of Engineers. 1991. *Evaluation of Dredged Material Proposed for Ocean Disposal: Testing Manual*. Document: EPA-503/8-91/001. February, 1991.

U.S. EPA and U.S. Army Corps of Engineers. 1994. *Evaluation of Dredged Material Proposed for Discharge in Waters of the U.S. - Testing Manual (Draft): Inland Testing Manual*. Document: EPA-823-B-94-002. June 2, 1994.

U.S. EPA. 1993. Environmental Monitoring and Assessment Program (EMAP) - Estuaries; Virginia Province - Quality Assurance Project Plan. U.S. EPA, Office of Research and Development, Washington, DC, 20460. 1993.

The analysis procedure selected for the extracted and cleaned-up samples should be determined based upon the detection limit objectives of the program (high resolution versus low resolution mass spectrometry, for example).

- Overall, CLH clearly appears to have some substantial quality control issues to contend with before they proceed with this program. We feel that addressing the quality issues is essential in order to consider data collected in the future valid and acceptable for assessing the contributions of PVSC's CSOs to the contamination of the Passaic River, (see recommendations).
- It appears that CLH used two different laboratories to perform the analyses; one for the more conventional priority pollutant parameters, and another laboratory for the PCB congener and dioxin/furan analyses. For the most part, the PCB and dioxin/furan results seem credible (measured concentrations reasonable and duplicates fairly consistent), in contrast to the remainder of the results.
- It is important to obtain the total suspended solids (TSS) data and the volume filtered for these samples, because with these data we would be able to calculate the concentrations associated with particulates in mg/L, which is the conventional approach used to evaluate contaminant loadings data. Presenting data in mg/L would also be consistent with the way that CARP data are being recorded.
- It is important to recognize, particularly from PVSC's perspective, that the concentrations of dissolved phase contaminants from the bulk sample are fairly low; perhaps lower than might be anticipated from a highly urbanized/industrialized watershed.
- There is a wide range of sampling/analytical questions that need to be addressed before the chemistry results can be interpreted and conclusions drawn. Some of those questions are as follows: (1) Is it accurate to assume that the unfiltered and filtered aqueous samples that were collected by CLH in January 2000 were obtained from the bulk sample that was collected on January 4, 2000, or was the bulk sample used only to obtain the samples which were filtered on January 7, 2000 for sediment analysis? (2) How did CLH extract the sediment samples which were obtained by filtering the bulk samples? This is a major question, because it relates to the common use of the "M" qualifier that is so prevalent in CLH's data. (3) How was the 400 L sample homogenized prior to collecting the samples for filtering?



## RECOMMENDATIONS

The following recommendations have been developed based upon CLH's report.

- CLH should conduct another field trial prior to implementing the full-scale CSO monitoring program. Based on the report that we reviewed, CLH has not demonstrated that they can collect and analyze aqueous samples for low-level contaminant determinations in a high quality fashion. CLH has stated that they intend to resample Saybrook Place as part of the full-scale sampling program, but in our opinion the re-sampling should take place prior to the full-scale program. Without a successful field trial in advance of the full-scale program, there is no reason to believe that the data which would be generated would be of sufficient quality to develop credible conclusions.
- CLH should reconsider the analytical approach to be used for measuring the filtered solids so that moisture in the sediments does not affect data quality. There are proven procedures for addressing moisture in sediment samples that can be implemented in the sample preparation stage.
- CLH should provide the suspended solids data for the bulk sample, as well as the volume filtered so that comparisons can be made between the filtered and non-filtered samples, particularly for the PCB and dioxin/furan results.
- CLH should consider using analytical methods which are equivalent to the methods being used in the CARP program so that the data can be incorporated into the CARP database.
- CLH should include both trip blanks and equipment blanks into their sampling scheme for their second trial run, and for their full-scale program.
- If you have any questions regarding these comments, please call me at 231-941-2230.